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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/023,723	12/21/2001	Biju Chandran	219.40780X00	5137
21186	7590	03/29/2004	EXAMINER	
SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A. P.O. BOX 2938 MINNEAPOLIS, MN 55402			MITCHELL, JAMES M	
			ART UNIT	PAPER NUMBER
			2827	

DATE MAILED: 03/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/023,723

Applicant(s)

CHANDRAN ET AL.

Examiner

James M. Mitchell

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 21 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,7,9-17 and 27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,7,9-17 and 27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1,3-5, 7, 9-17 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Milewski (US 6,330,967) in combination with Admitted Prior Art (APA).

4. Milewski (Fig 4, 5A) discloses a ceramic substrate with a CTE of at least 15 ppm/<sup>o</sup> C (21; Col. 4, Lines 23-24; App. Spec p. 10) a die (10), a plurality of interconnections between the substrate and a Silicon die (10), wherein respective ones of the interconnections include a relatively low melting temperature solder (portion, 39 closest to 35) with an inherent yield strength (via there is a strength to the bond) on the

die, a relatively higher melting temperature and electrically conductive, copper material (51) that extends a distance above the substrate and therefore is a standoff, in the form of a bump or column on the substrate, and an inherent soldered joint (portion of 39, closest to 51) connecting ("reflowed") the solder to one of the plurality of electrically conductive material, wherein the relatively higher melting temperature and electrically conductive material (51) on the substrate is formed as a standoff extending above a surface of the substrate, and a top surface of the standoff is in the form of a column forming a stiff protuberance and therefore a bump and is inherently wetted by the solder to form the solder joint (Abstract, reflow; Column 5, Lines 42-43); wherein the standoff has an inherent yield strength of 350-450 Mpa (applicant spec. 6, via conventional interconnect scheme); and further that said substrate is a PCB that has in inherent inter layer dielectric material under the interconnection/ solder connection (via PCB comprised of dielectric laminates under interconnection) and that said die is Silicon, and a plurality (Fig 4) of non-melting standoff (via copper) at the solder liquidus temperature upstanding where the joints connect the die to tops of respective ones of the standoff elements; and the die has a front side (bottom portion) with a plurality of low melting temperature and yield strength solder bumps thereon, wherein the die is capable (Fig 4) of being coupled to the substrate with solder bumps connected to standoff.

5. Milewski does not appear to explicitly disclose standoff being wetted by the reflowed solder bump or that the solder joint is connected to a reflowed solder joint or that the CTE of the substrate is at least 15 ppm/ $^{\circ}$ C and the CTE of the die is 2.7 ppm/C

less than that of the substrate, such that the CTE of the substrate is more than two times greater the CTE of the die.

6. However with respect to claim 1, the claim limitations of "standoff being wetted by reflowed bump" or "joint connected to ...reflowed solder," are process limitations and the prior art structure is the same as the claimed invention. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)

7. APA (Spec 10-11) discloses silicon chips having a CTE of 2.7 ppm/° C

8. It would have been obvious to one of ordinary skill in the art to form the chip of Milewski with CTE of 2.7, in order to provide a silicon chip as required by Milewski (Fig 5A, "Si").

### ***Response to Arguments***

9. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection. However, in an effort to expedite prosecution, examiner will address applicant's arguments that appear applicable.

Applicant claims that cited reference teach away from applicant's claimed invention, because the cited reference does not disclose joint connected to a reflowed solder bump, but that the overall solder is reflowed. Examiner respectfully disagrees,

the limitation of reflow is a process step and does not further limit the claim because it does not impart structural limitations. A solder interconnect is inherently formed of multiple contiguous layers, thus a lower portion of solder connected to a portion of solder above it is within the broad scope of the claim language. As for the claim of low temperature, while Milewski explicitly discloses a low temperature solder (via lower in temperature than item 35), it likewise is lower than the melting temperature of copper,<sup>5</sup> and therefore is within the scope of the claim as broadly interpreted.

### ***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 6:30-3:30.

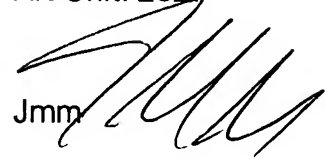
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571) 272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

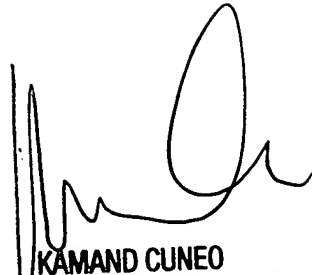
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Jmm 

  
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